

**THE PENNSYLVANIA RAILROAD**

**ELECTRICAL OPERATING  
INSTRUCTIONS**



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**E F F E C T I V E**

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THE  
FEDERAL  
BUREAU OF  
INVESTIGATION  
UNITED STATES  
DEPARTMENT OF JUSTICE  
WASHINGTON, D. C. 20535

MEMORANDUM FOR THE DIRECTOR  
FROM THE SAC, NEW YORK  
SUBJECT: [Illegible]

RE: [Illegible]

DATE: 10/10/68  
BY: [Illegible]

100-100000-10000

## **THE PENNSYLVANIA RAILROAD**

### **ELECTRICAL OPERATING INSTRUCTIONS**

The instructions herein set forth govern the a-c electrically operated portion of the railroad and must be observed by all employes whose duties are in any way affected thereby. They supersede all previous instructions inconsistent therewith.

H. L. NANCARROW,  
General Manager, Eastern Region.

A. F. MCINTYRE,  
General Manager, New York Zone.

*Approved:*  
H. T. COVER,  
Chief of Motive Power.

*Approved:*  
J. L. GRESSITT,  
Chief Engineer.

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## **ELECTRICAL OPERATING INSTRUCTIONS**

### **CAB SIGNALS**

1. Departure test of cab signals, when required on multiple unit trains, shall be made promptly when taking charge of equipment. After test has been completed, control plug should not be pulled (except to re-set) nor control cut-out switch opened nor cab signal warning whistle cut out. If desired to be relieved from holding the master controller in the OFF position, deplete the brake pipe pressure by making a service brake pipe reduction of 25 lbs or more and permit the master controller handle to go to DEAD MAN position, but be in operating position and release brakes at least four minutes before leaving time.

2. Departure test of cab signals, when required on electric engines, shall be made from both ends. When two or more electric engines are coupled in multiple, departure test shall be made from front end of leading engine and rear end of trailing engine. All cab signals and warning whistles should be operative on all engines. When two or more electric engines are coupled in multiple and it becomes necessary enroute to operate one of these engines from an end from which departure test of cab signals has not been made, the engine should be considered as not equipped.

### **CATENARY**

1. Tracks equipped for electrical operation are specified on the time-table.



2. Motor stop sign indicates end of trolley wire. Electric engines or multiple unit cars must not pass this sign with pantographs up.

3. At certain locations, on main tracks, sidings, secondary tracks, storage and classification yards where minimum clearance of approximately 24 feet, 6 inches is provided between trolley wire and top of rail, employees are permitted to ride or work on top of cars and other equipment in the performance of their duties, not permitting any part of their bodies, clothing, tools or materials to get closer than three feet to wires. Such locations are designated HIGH WIRE territory, limits of

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which are marked by HIGH WIRE and LOW WIRE signs:




4. When an overhead wire failure occurs that may obstruct tracks, all tracks that may be affected must be protected immediately.

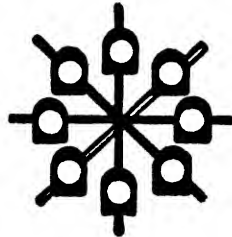
5. When a broken wire or obstruction in overhead catenary is found which may damage a pantograph, a signal must be given an approaching train on track involved by swinging a hand, flag or lamp vertically in a circle at arm's length.

When this signal is received, it shall be acknowledged at once by two short sounds of the engine whistle and pantographs must be dropped immediately. After passing the break or obstruction, pantographs may be raised.

#### PHASE BREAK SIGNS AND INDICATORS

1. Phase break signs  are located on first catenary pole in advance of a phase break.

2. Position light phase break indicators of type shown



are located in advance of the phase break sign. When indication is displayed, all electric trains approaching a phase break on any track will be governed by the following:

One engine with one pantograph up:

Place controller in OFF position before entering the phase break, keeping it in that position until after the phase break is passed.

One engine with both pantographs up, two or more engines and multiple unit trains:



Drop pantographs before entering the phase break, keeping them down until after the phase break is passed.

3. Phase breaks are located as specified on the time-table.

### STEAM ENGINES TAKING WATER, COAL OR SAND

1. Authorized locations for use when steam engines take water, coal, or sand under the trolley wire are specified on the time-table.

2. Steam engines must not take water while standing on electrified tracks, except in the manner prescribed below and at locations specified on the time-table.

When taking water at authorized locations, employees are not permitted on top of tender of engine until standpipe is moved into position for taking water. Employees must descend from top of tender before standpipe is returned to normal position. Ladder on rear of tender must be used in ascending to or descending from top of tender.

3. Employees must keep themselves, tools and material at least three feet away from wires at all times.

### HIGH WIRE STANDPIPE SECTIONS

1. Certain locations of standpipes for use when steam engines take water under high trolley wire are specified on the time-table. The limits of these sections are designated by standpipe section signs—

STANDPIPE  
SECTION

2. These standpipes are equipped to automatically de-energize trolley wire for at least fifty feet in each direction when standpipe is moved into position for taking water.

3. When one or more electric engines are coupled to a steam engine requiring water, the pantographs of the electric engine or engines must be in the down position, to prevent bridging from an energized to a grounded trolley section, before the standpipe is moved from its normal position. Pantographs must not be raised until after standpipe is returned to its normal position.

4. Electric engines or multiple unit cars operating on a track which is occupied by a steam engine taking water must not pass

STANDPIPE  
SECTION

sign until after stand-

pipe is returned to its normal position.

## DEAD SECTIONS

1. Dead sections are installed in trolley wire at certain locations specified on the time-table. The limits of these sections are designated by dead section signs—

DS

2. All electric trains approaching a dead section will be governed by the following:

One engine with one pantograph up, two or more engines coupled with not more than one pantograph up on any engine, and multiple unit trains:

Place controller in OFF position before entering the dead section, keeping it in that position until after the dead section is passed.

One engine with both pantographs up, two or more engines coupled with two pantographs up on any engine:

Drop pantographs before entering the dead section, keeping them down until after the dead section is passed.

## PANTOGRAPHS

1. Pantograph poles are carried on all a-c electric engines and a-c multiple unit cars and are located at all block and interlocking stations. Rubber gloves are carried on all electric engines and are located at all block and interlocking stations. After use, the pantograph poles and rubber gloves should be returned to the proper receptacle and report made of their use to the superintendent.

2. Condition of pantograph should be observed frequently. In case of a defective pantograph, report should be made to the superintendent.

3. Under normal operation of single or coupled electric engines, rear pantograph shall be up on each engine. When a rear pantograph is defective, it shall be down and the front pantograph shall be up. When engines are coupled the front pantograph of a trailing engine should not be up while the rear pantograph of the adjoining leading engine is up, when it can be avoided.

When pantograph frames, shoes or end horns show indication of having been struck, and when it is apparent that further damage will result, train shall be stopped immediately and the condition shall be promptly reported to the superintendent.

When pantograph frames, shoes or end horns show indication of having been struck, and when it is obvious that further damage will not be incurred, the train shall

be stopped at the nearest telephone where conditions shall be reported to the superintendent.

4. When necessary to keep pantographs down because of defective condition on engines or multiple unit cars, grounding switches must be fully closed and pinned, except that when such equipment is moved through North or East River Tunnels (New York Division), all grounding switches must be open and the following will govern:

Pantograph must be securely tied down with no part extending above locked down height, except when defective condition is other than damaged pantograph and control air pressure is maintained in the down cylinder.

5. While being sanded, electric engines must have pantographs down and hand operated grounding switches closed.

6. On multiple unit cars not equipped with master controller, a pantograph control switch is installed on the switchboard to lower the pantograph, in the same manner as pantograph down button operates on multiple unit cars equipped with master controller.

7. When necessary to de-energize overhead wires or third rail to prevent loss of life or damage to property, power director must be notified immediately, and person so notifying power director, shall await his instructions. The location and jurisdiction of power directors are specified on the time-table.

## TONNAGE RATING AND NOTCHING RESTRICTIONS

### PASSENGER

1. Tonnage rating and notching restrictions for single electric engines operating in passenger service will be as follows, unless otherwise specified:

#### TYPE GG-1, R-1 AND P-5a ENGINES

	BETWEEN NEW YORK- WASHINGTON BOTH DIRECTIONS HARRISBURG-PHILA EASTWARD PAOLI-HARRISBURG WESTWARD		BETWEEN PHILADELPHIA OR NORTH PHILADELPHIA AND PAOLI—WESTWARD	
Notching Restrictions	Tons	Maxi- mum Cars	Tons	Maxi- mum Cars
None	1445 or Less	20	1330 or Less	20
18th Notch	1446 to 1750	27	1331 to 1600	27
16th Notch	1751 to 2500	30	1601 to 2000	30

#### TYPE O-1 ENGINES

Class	0-1a	0-1b	0-1c
Notching Restrictions	Tons	Tons	Tons
20	—	—	675
18	670	580	740
17	—	—	780
16	750	650	815
15	785	680	—
14	825	715	—

Class O-1 engines 7850 or 7851 are each limited to seven (7) cars, not exceeding 430 tons.

When the tonnage or the number of cars of a train exceeds values specified above, the train should be double-headed. The computed tonnage and number of cars of a double-headed train should be considered equally divided between the engines. Notching restrictions should be observed when tonnage or number of cars thus computed for a single engine exceeds the minimum values specified above.

2. Electric engines, in passenger service with one motor circuit cut out, are limited to percentages of the above tonnage ratings as follows:

TYPE OF ENGINE	PER CENT OF TONNAGE RATING
GG-1	60
R-1	40
P-5a	40
O-1	30

Type GG-1 engines, with two motor circuits cut out, should not be used in passenger service when it can be avoided, and then only in multiple operation. Tonnage rating is then limited to 20 per cent of the value specified for a type GG-1 engine with all motor circuits in service.

3. Class L-6 and L-6A electric engines in passenger service are limited to 80 per cent of GG-1 engine tonnage rating.

4. The weight of a train must be known before leaving a terminal and at intermediate points where consist of train is changed. A report shall be made to the superintendent before moving trains which exceed the engine tonnage rating.

The engineman shall be advised the weight of train.

5. A train heavier than 2000 tons should not be handled through North or East River Tunnels (New York Division) without doubleheading.

6. A train heavier than 1750 tons should not be handled southward through the B&P Tunnel at Baltimore (Maryland Division) without doubleheading.

#### TONNAGE COMPUTATION

1. In computing tonnage for operation of electric engines in passenger service, use weights as shown in following table:

##### CARS

TYPE OF CAR	TONS EMPTY	TONS LOADED	
		MAIL SERVICE	BAGGAGE AND EXPRESS SERVICE
B-60, and foreign baggage ...	55	75	65
B-70 .....	60	85	75
B-74 .....	65	..	80
BM-70 .....	70	80	..
M-70 .....	65	80	..
MBM-62 .....	50	60	55
R-50, R-60, and foreign refrigerator .....	50	70	65
X-29 .....	25	50	40
	TONS EMPTY	TONS LOADED	NOTE
PB-70, PBM-70, PDB-70 .....	70	75	A
P-85b-R .....	70	75	B
Coach, observation .....	75	75	B
Coach, lightweight .....	55	60	B
Cafe, cafe-lounge .....	70	70	A
mP-54 .....	45	45	C
mPB-54, mPBM-54 .....	50	50	C
Coach, all other .....	65	70	A
Diner, twin-unit .....	180	180	B
Diner .....	95	95	B
Diner, lightweight .....	65	65	B
Business, 7525-7531 .....	75	75	B
Business, all other .....	95	95	B
Pullman .....	90	90	B
Pullman, lightweight .....	65	65	B

Note: For air-conditioning

A—When car is equipped, add 10 tons

B—Weight has been included

C—These cars are not equipped

*Effective November 1, 1947.*

## ENGINES

### ELECTRIC ENGINES HAULED DEAD IN TRAINS

TYPE OF ENGINE	TONS
P-5, P-5a .....	197
GG-1 .....	239
R-1 .....	201
O-1 .....	155
L-6 .....	153
DD-2 .....	225

## FREIGHT

1. The following ratings require momentum operation of ruling grades and certain intermediate grades, and in case train is stopped on such grades, assistance should be procured before starting.

All speed restrictions shall be observed, starting and acceleration closely watched, and weak field operation for long periods avoided as much as possible.

## NOTCHING RESTRICTIONS

P-5a .....	18th Notch
GG-1—90 mph Gear .....	17th Notch

## ADJUSTED TONS—FACTOR 20

	DIREC- TION	P-5 P-5a	GG-1 90 mph	DD-2	P-5b	NOTE
Potomac Yard- Bay View	N S	4000 5100	5000 5720	5340 5720	5670 6075	A
Bay View- Edgemoor	N S	6850 5815	6600 6220	8170 7300	8680 7700	
Edgemoor- Grays Ferry	N S	6850 5815	6600 6630	8160 7320	8650 7750	B
Grays Ferry-Jersey City Terminals	E W	6850 5815	6600 6320	8160 7320	8650 7750	C D
Enola-Jersey City Term. & So. Amboy via Low Grade	E W	6300 4950	6000 4800	8000 5500	8500 5800	E F
Enola-52nd Street  via Low Grade	E W W E W	6300 4400 4950 4200 2240	6000 4800 — 4750 2850	8000 5500 — 5000 3400	8500 5800 — 5450 3600	G H K
Harrisburg- 52nd Street via Main Line	E W W W	4200 4400 4950 2240	4750 4800 — 2850	5000 5500 — 3400	5450 5800 — 3600	H K
Harrisburg-52nd St. via Columbia Br.	E W W	3100 4400 4950	3550 4800 —	4200 5500 —	4600 5800 —	H K
Enola- Bay View	E W	7000 6000	6900 6000	8000 7300	8500 7700	I
Enola- Edgemoor	E W	6400 5900	6600 6000	7650 7300	8100 7700	I
Frankford Junction-Pavonia	E E W W	4375 2520 2940 2030	4760 3420 3180 2510	5600 4300 3720 3040	5600 4300 3720 3040	J J

**NOTE: Helpers required.**

- A. Bay View-Fulton Junction.
- B. Gray's Ferry, if stopped.
- C. Gray's Ferry-North Phila., if stopped.
- D. Waverly Yard.
- E. Brown-South Amboy.
- F. South Amboy-Brown; and Morrisville Yard, if stopped.
- G. Thorndale-Paoli.
- H. 52nd Street-Bryn Mawr.
- I. At Perryville, if stopped.
- J. On Delaware River Bridge approach, if stopped.
- K. 52nd Street-Paoli.

2. Electric engines, in freight service with one motor circuit cut out, are limited to percentages of the above tonnage ratings as follows:

TYPE OF ENGINE	PER CENT OF TONNAGE RATING
GG-1	60
P-5	40
P-5a	40
P-5b	40
DD-2	40

3. On the grade from Columbia to Atglen—(A.&S. Branch—Philadelphia Division):

Trains having tonnage over 90 per cent of engine rating:

Speed is limited to 35 mph; unless stopped at or passing either Columbia or Port at less than 25 mph, in which case speed is limited to 30 mph.

Trains having tonnage not more than 90 per cent of engine rating:

Speed is limited to 40 mph; unless stopped at or passing either Columbia or Port at less than 25 mph, in which case speed is limited to 35 mph.

4. Electric engines assigned to passenger service for which no freight tonnage rating is specified shall not be used in freight service. Other electric engines assigned to passenger service may be used on freight trains in emergency, observing adjusted tonnage ratings and notching restrictions in effect for these engines in freight service.

## AUTHORIZED CURRENT RATINGS

1. Authorized current ratings for various types of electric engines.

TYPE	OVERLOAD RELAY SETTING	MAXIMUM ACCELERATING CURRENT	
		AMPERES	NOTCH
B-1	1550	1550 1100 1060	Starting Ten Minutes One Hour
GG-1 (90) (4801-4857)	2750	*Below 2750 2300 2000	Starting Up to 17th Notch Incl. 18-22
GG-1 (100) (4858-4938)	3000	*2800 2500 2200	Starting Up to 17th Notch Incl. 18-22
L-6	4100	4000 3500	1-16 17-20
O-1	3100	2500 2000	1-16 17-20
O-1a	4500	4000	_____
O-1b	3000	2500	_____
O-1c	4600	4000 3500	1-16 17-20
P-5a	4600	4000 3500	1-16 17-18
R-1	3600	3400 3200 3000	1-16 17-19 20-22

\*If necessary to use higher starting current make detailed report at end of trip.

## MULTIPLE OPERATION

1. Electric engines may be operated in multiple by use of control jumpers only as follows:

B-1 with B-1	O-1b with O-1b
DD-2 with DD-2	O-1c with O-1c
GG-1 with GG-1	P-5 with P-5 or P-5a
L-6 with L-6 or L-6a	P-5a with P-5 or P-5a
L-6a with L-6 or L-6a	P-5b with P-5b
O-1 with O-1	R-1 with R-1
O-1a with O-1a	

## SNOW SCREENS

1. If snow screens are not applied to electric engines before leaving terminal and the engines run into a snow storm enroute, snow screens must be applied and properly secured.

Engines hauling passenger trains may have the snow screens applied at station stops or while the engines are drifting on the road. Engines hauling freight trains may have the snow screens applied when the trains stop at convenient location or while the engines are drifting on the road.



## MULTIPLE UNIT CARS

1. Heater switches should be opened at least fifteen minutes before arrival at terminal, when this can be done without discomfort to the passengers.

2. When outside temperature is 25 degrees or below, or it is snowing, rear vestibule and two side doors should be closed on rear car of train and cab heater turned on to prevent brake valve becoming too stiff to operate.

3. When practicable, multiple unit trains arriving at yard or terminal should have pantographs lowered promptly, unless other instructions prevent.

4. When traction motors on a multiple unit car become inoperative enroute the control cut-out switch should be opened. If difficulty is then experienced in starting the train, the current limit relay cut-out switch seals should be broken and switches closed on all operative cars. The switches should be opened as soon as conditions permit and report made at end of trip.

5. Heat numeral signs 0—1—2—3 will be displayed at locations specified on the time-table. Unless otherwise instructed by the superintendent, power directors will obtain outdoor temperature readings at frequent intervals and will direct display of heat numeral signs in accordance with the following:

Temperature above 55 degrees .....	0
Temperature between 30 and 55 degrees .....	1
Temperature between 20 and 30 degrees .....	2
Temperature below 20 degrees .....	3

Multiple unit car heater switches shall be operated to conform with heat numeral signs at all times, except to decrease car temperature when required and except as otherwise specified on the time-table.

Cold cars at terminals should be heated prior to departure. No. 3 heat applied to a cold car will raise car temperature to 65 degrees in approximately the following elapsed time:

OUTSIDE TEMPERATURE	TIME REQUIRED
5 degrees	2 hours, 10 minutes
15 "	1 hour, 50 "
25 "	1 " 25 "
35 "	50 "
45 "	25 "
55 "	10 "

6. Multiple unit trains shall not assist in starting trains hauled by steam or electric engines.

7. Multiple unit cars equipped with pantographs having maximum operating height of less than 24 feet, 6 inches, shall not be operated in high wire territory with pantographs up.

8. Before leaving the operating compartment on multiple unit equipment, a full service application of the brakes must be made, and suitable steps taken to prevent unauthorized operation of equipment.

At the end of run or when changing operating location a full service application of the brakes shall be made, and cut-out cock in brake pipe closed before removing the brake valve handle. The controller and brake valve handles should then be removed and the end door swung into position and latched against the master control apparatus. The drop window in the side door should be closed.

9. When making movements of multiple unit cars with two enginemen, one operating from each end, the air brake shall be applied and the cut-out cock closed on the end which had been the operating end before movement is started in the opposite direction. This is necessary in order to have full control of the air brakes at the end from which the train is operated.

10. Extra passenger trains consisting of multiple unit cars, operating in through trains, should not exceed a speed of 50 mph.

11. When power is shut off motors on a multiple unit train moving at speed in excess of 30 mph, power should not be re-applied until speed has been reduced to less than 30 miles mph, except on multiple unit trains consisting entirely of double unit cars. This is necessary to prevent motors from flashing over.

12. Multiple unit cars with motors inoperative may be placed in trains at terminals, only when necessary to move inoperative cars to shops for repairs and in extreme cases of deranged car supply to avoid serious delays, as follows:

TOTAL NUMBER OF CARS IN TRAIN	4	5	6	7	8	9	10	11	12	13	14
BETWEEN	NUMBER OF INOPERATIVE CARS										
Jersey City—New Brunswick — Trenton—Phila.—So. Amboy .....	0	1	1	2	2	2	3	—	—	—	4
Broad St. Suburban Station — Chestnut Hill—White Marsh .....	0	1	1	1	1	2	3	—	—	—	—
Broad St. Suburban Station — Norristown .....	0	0	1	1	1	2	3	—	—	—	—
Other Points .....	0	1	1	1	2	2	3	3	3	3	4

NOTE: When motors of a double unit car are inoperative, such car and its trailer are to be counted as two cars.

13. A multiple unit car may be moved dead in a passenger train at a speed of 65 mph for single unit cars and 70 mph for double unit cars, and in a freight train at 50 mph, unless the condition of the car is likely to cause damage, in which case speed shall be restricted.

Electrically equipped cars moved in freight trains should be placed on rear just ahead of cabin car.

14. Multiple unit trains operated from any position other than front end of train must not exceed speed of 30 mph.

#### STEAM HEATING BOILERS ON ELECTRIC ENGINES

1. After preparation of boiler, the fire should be extinguished if practicable, to prevent unnecessary use of oil and water.

2. The boiler shall be put in service, and sufficient water and steam pressure obtained prior to coupling engine to train. In freezing weather, sufficient steam should be passed from the end valves to the atmosphere to prevent freezing.

3. Where no discomfort to passengers will result, steam should be shut off train and boiler fire extinguished in advance of arrival at terminal. Where engine is changed at intermediate points steam should not be shut off.

4. The superintendent shall be advised, from first convenient point, of failure to properly heat train, with the cause.

5. Fire shall be extinguished and burner decarbonized as follows:

A. Crack decarbonizing valve until flame starts to flicker, then close oil valve.

B. Open decarbonizing valve and decarbonize burner.

C. Cycle combustion controller to high flame position and scavenge fire box of all gases.

6. Seven sounds on the communicating signal will indicate SHUT OFF STEAM.

7. When standing under LOW WIRES, the boiler should be operated in LOW FLAME.

8. During the summer season when specified by the superintendent, steam will be furnished for the operation of steam jet air conditioning apparatus, dining car steam

7  
tables, and facilities. Engineman should be advised when steam is required. During the summer season, steam heat regulating valves in all cars should be kept closed.

### SLEET INSTRUCTIONS

1. C.T.290 Special Instructions must be observed at all times.

2. The first indication of sleet shall be reported promptly to the superintendent, who will issue a double pantograph order when conditions warrant.

3. With double pantograph order in effect, electric engines, operating singly, shall run with both pantographs up, except at phase breaks and dead sections.

Electric engines, coupled, shall run with both pantographs up on leading engine and rear pantograph up on each trailing engine, except at phase breaks and dead sections.

4. With double pantograph order in effect, pantograph extra pressure device on multiple unit cars and B-1 engines shall be used as follows:

A. As soon as sufficient sleet forms on the pantograph to cause it to leave the trolley wire, the pantograph UNLOCK button should be pushed in and locked with the pin provided for that purpose.

B. As soon as sleet stops forming and pantographs are free of ice, the UNLOCK button should be released to eliminate excessive pressure on the trolley wire.

C. The locking pin should be removed when it is desired to lower and latch down the pantographs.

5. When excessive arcing occurs due to sleet formation, double pantograph operation shall be followed without waiting for instructions.

6. Patrol trains, consisting of five or more multiple unit cars or two electric engines coupled, will be assigned to remove sleet from trolley wires. In case of heavy sleet, it may be necessary to open the control switches on the leading car or open motor cut-out switches on the leading engine, in order to reduce excessive arcing. A qualified lineman, instructed in renewal of pantograph shoes, will be assigned to accompany each patrol train.

Patrol train will be equipped with one ground stick and five pantograph shoes.

7. Two electric engines, coupled, light, operated as a patrol train to remove sleet from trolley wires, shall run with two pantographs up on the leading engine, and with rear pantograph up on trailing engines except at phase breaks and dead sections. Any three pantographs may be up in an emergency, but the rear pantograph of the leading engine and the front pantograph of the trailing engine shall not both be up at the same time when it can be avoided.

When the trolley wire is heavily coated with sleet, speed should be reduced below 30 mph, in order to effect better removal of sleet from the trolley wire with minimum wear on the pantograph shoes.

8. Electrified sidings and yard tracks will be given required attention with patrol trains.

9. Electric engines and multiple unit cars in yards, storage tracks, or standing at any point, should have pantographs lowered and raised frequently, to prevent accumulation of sleet. In case pantographs operate sluggishly, the pantograph pole should be used to raise and lower pantographs to remove sleet.

10. Wire trains will be manned and held available at advantageous points for immediate call during sleet storms.

11. During sleet storms, pantograph shoes of all electric engines in passenger and freight service will be inspected at locations specified on the time-table.

12. When pantographs lower due to sleet or when sleet load on pantographs becomes excessive resulting in heavy arcing between shoe and wire, master controller shall be shut off, and an attempt made to raise and lower the pantographs several times. If this fails the train shall, if possible, be stopped under a trolley wire which is five or more feet above the roof of engine or multiple unit car and an attempt made to raise and lower the pantographs several times with the pantograph pole. If formation of sleet is such that the pantograph can be made to operate only by removing the sleet, the procedure outlined below shall be followed:

**A. When the energized trolley wire is five feet or more above the roof of engine or multiple unit car:**

*A1. Before going on roof or touching any part of pantograph assembly—*

1. Full control air pressure must be obtained.
2. The pantograph DOWN button must be in the IN position.
3. Battery switches must be closed.
4. All pantographs must be down.
5. Ice must be removed from step treads leading to roof to insure safe footing.
6. All grounding switches must be closed and locking pins inserted.
7. The position of all overhead wires must be noted.
8. Pantograph must be held down by latches, and grounding switches must be making proper contact.

*A2. While working on the roof—*

1. Extra precautions against slipping must be taken.
2. Keep at least three feet from all wires.
3. Stand astride pantograph tubing so it cannot raise, but do not bear excessive weight on tubing which might throw it out of position.
4. Do not work directly under the wires.
5. Lightly tap tubing, springs, rods, shoes and other parts to remove sleet.
6. Before descending, be sure that all pantographs are held down by latches, and grounding switches are in.

*A3. After all persons have descended—*

1. Keep as far as possible from all normally energized parts.
2. Open grounding switches.
3. Prepare engine or cars for service.
4. Proceed.

**B. When the energized trolley wire is less than five feet above the roof of the engine or multiple unit car, the superintendent must be advised and arrangements made for the necessary protection.**

13. At terminals, sufficient men will be provided to remove sleet from pantograph assemblies.

When this type of work must be done under an energized wire, and is of sufficient magnitude to require a number of groups working on different engines or multiple unit cars, the supervisory employe shall designate one man in charge of each group to be responsible and

know that each member of his group follows the procedure outlined in the preceding paragraph.

14. When request is made to stop engine for pantograph inspection by qualified employe, the pantograph shall be lowered and left down until the inspection is completed. During the interval that pantograph is down, manual control of the boiler should be used along with the stack blower to permit operating without power.

### GENERAL

1. Electric engines equipped with drop couplers when operating in road service shall have the front coupler in DROP position.

It must be known that the couplers are in proper position while the engine is in service.

2. When two or more electric trains stop on the same track a short distance apart, the following train should not start until the preceding train shall have been moving 30 seconds.

3. Unless special authority is granted, not more than two persons, in addition to engine crew, are permitted to ride on front platform of multiple unit trains or operating compartment of electric engines.

4. Master controller handle of multiple unit cars and emergency train brake attachment to master controller of electric engines, in road service, must NOT be blocked, fastened, or otherwise tampered with to prevent spring tension returning them to emergency position if engine-man's hand and/or foot is removed.

In the event of failure of DEAD MAN feature on multiple unit cars or electric engines to function, the train shall proceed only with a second member of the crew in the operating end. A report to the superintendent should be made without delay to the train.

Electric engines operating in yard service must have emergency train brake attachment made inoperative.

5. When electric engines are set off enroute, the engine should be properly secured by applying the hand brake after the air brake has been released.

6. When electric engines are assisting steam trains, coupled ahead or on the rear, the slack should be taken by the steam engine.

When electric engines help on rear, extreme care should be taken to avoid damage when starting. Current should

not be used to keep the engine against the train while standing.

7. When electric engines or multiple unit cars are derailed and contact is broken with electric return circuit, the engines or the multiple unit cars must be considered energized. All persons must maintain proper three feet clearance between derailed equipment and ground, until pantographs have been lowered or trolley wire de-energized and grounded.

8. On trains carrying military or circus equipment and shipments accompanied by guards or attendants, the train commander or person in charge shall be notified to warn guards and attendants that they must not go on top of high lading or on roof of cars under overhead wires.

### EXTINGUISHING FIRES

1. Fire extinguishing equipment should be ready for service at all times.

2. In case of fire on electrical equipment the power must be removed at once. The circuit must be grounded if possible before using fire extinguishers. If the extent of the fire requires calling Private or Public Fire Departments, they must be advised if the equipment is energized or if it is *DEAD*.

3. **Carbon-Dioxide (CO<sub>2</sub>)** extinguishers are effective on fires involving electrical apparatus, circuits and oils, and are not injurious to electrical apparatus, circuits and oils. They discharge very rapidly as follows:

20 lb	size—60	seconds
15 lb	" —45	"
10 lb	" —10	"
2 lb	" —7	"

It is, therefore, important to bring the extinguisher close to the fire before opening the valve. See card of instructions on extinguisher detailing method of use.

4. **Carbon Tetra-Chloride** (1 qt pump type) extinguishers are effective on fires involving electrical apparatus and oils, and are not injurious to electrical apparatus, circuits and oils. When using this type of extinguisher the operator should remain outside of small confined or unventilated spaces. **BE SURE TO HAVE AMPLE VENTILATION.**

5. **Foam** extinguishers are effective on fires involving oils and ordinary combustible material. They should



NOT be used on electrical apparatus unless the Carbon-Dioxide and Carbon Tetra-Chloride extinguishers have been exhausted, or are not available. These extinguishers are injurious to electrical apparatus and circuits.

6. **Soda and Acid** extinguishers are effective on fires involving ordinary combustible material. They should NOT be used on electrical apparatus unless the Carbon-Dioxide and Carbon Tetra-Chloride extinguishers have been exhausted or are not available. These extinguishers are injurious to electrical apparatus and circuits.

7. **Oil Circuit Breaker and Transformer Fires** may cause burning oil to be thrown on other electrical apparatus, and to flow through indoor floor openings. Carbon-Dioxide extinguishers should be used for first application, followed by the use of sand or earth to prevent fire spreading on the floor or ground.

A Carbon Tetra-Chloride extinguisher may be used, and the Foam type used only if necessary, where it can be applied to burning surfaces and inside of tanks. Where piping systems permit, return oil to drainage tank.

8. **Air Cooled Apparatus Fires**—including transformers and rotating machinery. First, stop all air cooling appliances and close dampers before applying extinguisher to burning parts. Carbon-Dioxide extinguishers should be used for first application followed by Carbon Tetra-Chloride. Water may be used as a last resort.

## OTHER INSTRUCTIONS

In addition to the foregoing instructions, the following rules and instructions are in effect:

C.T. 290—Special Instructions for Employees in Electrified Territory.

No. 215—Electric Locomotive Classes P-5a, Modified P-5a and GG-1 Engineman's Instruction Book.

No. 204—Questions and Answers on Alternating Current Electric Locomotives, Alternating Current Multiple Unit Cars and Oil Fired Boilers for Steam Heat.

No. 138-A—Hudson & Manhattan Electric Train Service Instructions.

NOT be used on electrical apparatus unless the Carbon  
Bioxide and Carbon Tetrachloride extinguishers have  
been expanded or are not available. These extinguishers  
are important to electrical apparatus and circuits.

3. Soda and Acid extinguishers are effective on fires  
involving ordinary combustible material. They should  
NOT be used on electrical apparatus unless the Carbon  
Dioxide and Carbon Tetrachloride extinguishers have  
been expanded or are not available. These extinguishers  
are important to electrical apparatus and circuits.

4. Oil Circuit Breaker and Transformer fires  
may cause burning oil to be thrown on other electrical ap-  
paratus and to flow through insulating bushings. Car-  
bon Dioxide extinguishers should be used for this  
type of fire. The use of sand or water is pro-  
hibited. Extinguishers should be used for this  
type of fire.

5. A fire in a transformer or circuit breaker should be  
extinguished by using a Carbon Dioxide or Carbon Tetra-  
chloride extinguisher. Water should not be used. Ex-  
tinguishers should be used for this type of fire.

6. Air-Insulated Apparatus fires involving trans-  
formers and switching equipment. First stop all air  
supply to the apparatus and then discharge before applying  
extinguisher to burning parts. Carbon Dioxide extin-  
guishers should be used for this type of fire. Ex-  
tinguishers should be used for this type of fire.

## GENERAL INSTRUCTIONS

1. Read the following instructions carefully before using  
any of the following equipment.

2. Read the following instructions for the use of the  
equipment.

3. Read the following instructions for the use of the  
equipment.

4. Read the following instructions for the use of the  
equipment.

5. Read the following instructions for the use of the  
equipment.



